

Direct synthesis of Cubic Pt Nanoparticles In the Mesoporous Silica SBA-15

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The deposition of shape-controlled nanoparticles into a mesoporous supports is difficult. In previous researches, some methods to deposit shape-controlled platinum nanoparticles with 5-10 nm size were studied. The formation of a mesoporous framework around the shaped nanoparticles and capillary inclusion are general methods. But the shape of nanoparticles can be degraded and aggregated easily. In this research, platinum nanoparticles were directly nucleated inside the mesoporous silica and overgrown into cubic shape. MPTMS was used as an anchoring agent and it also shape-control the nanoparticles. In previous researches, cubic platinum nanoparticles were synthesized with polymeric capping agents like PVP and deposited inside pore structure of mesoporous silica by sonication. But most of the platinum nanoparticles were clogged and there were low amount of active sites on the surface of the platinum. Randomly shaped platinum nanoparticles were synthesized by wet impregnation method and showed clean catalytic active sites on the surface of platinum nanoparticles in this research. But the selectivity to pyrrolidine in pyrrole hydrogenation was poorer. The pore structure and the residual thiol groups might cause the high selectivity for pyrrolidine.